

**ALBERTA INFRASTRUCTURE AND TRANSPORTATION
TECHNICAL STANDARDS BRANCH**

TPC-05

**SPECIFICATION FOR
WHITE AND YELLOW TRAFFIC PAINT**

A. SCOPE

This specification covers the production and supply of white and yellow paint, to be applied by spray equipment to bituminous pavements, with "drop-on" or overlay reflectorizing beads, for the marking of traffic zones.

B. INTENT

It is the intent of this specification to approve for use by Alberta Infrastructure and Transportation Contractors' standard traffic paints based on service, with the composition of the paint being left up to the supplier. Service shall take into account appearance, durability and night visibility.

C. GENERAL

1. Notwithstanding anything else contained herein, the paint supplied shall be of the highest quality, suitable for the purpose intended using application equipment normally used by the Contractor.
2. All paint must be applicable, without the use of thinners, at a rate of 375 microns, wet film thickness and with overlay beads applied at a rate of 0.6 kg/litre of paint.

D. SAMPLES

1. Each supplier will be permitted to submit two samples of paint of each colour, if he desires, provided that the two paints of the same colour are of sufficiently different formulation of character. The testing of these samples will be used to prequalify the suppliers.
2. Each sample shall consist of three only four litre containers and five only one litre containers, of the paint.
3. Samples shall be delivered prepaid to the designated address by the specified dates.
4. Each container shall be properly labelled with the statement, "Year white traffic paint" or "Year yellow traffic paint", along with the supplier's name and a formulation number. Labels shall be fastened such that they may be readily removed.

5. A complete report of the paint properties and composition as determined by the supplier, shall be submitted with the sample. This will be held in confidence and is for the Department's use only.

E. SPECIFICATIONS

1. Requirements which may be applicable to this specification may be found in:
 - (a) in the latest edition of the American Society for Testing and Materials (ASTM) Standards
 - (b) the Canadian General Standards Board (CGSB) 1-GP-71 "Schedule of Methods of Testing Paints and Pigments".
2. All paint shall meet the specifications as indicated herein, without the use of thinners.
3. Failure of the sample to meet the specifications shall be considered as cause for rejection.
4. The paint shall be homogeneous and well ground to a uniform and smooth consistency. It shall not skin, cake, liver, thicken, gel or settle extensively in the container when stored up to one year. It shall be capable of being remixed easily to a uniform condition, within 15 minutes using a mechanical paint shaker.
5. The paint shall be free from dirt and/or other foreign matter.
6. The paint shall be capable of being applied using pavement marking equipment similar to the Contractor's traffic marking application equipment without difficulty and with or without the overlay beads.
7. The paint shall flow evenly and smoothly, covering the surface solidly in one coat, without running.
8. After drying, the paint shall have a pure white (for white paint) or yellow (for yellow paint) flat or semi-gloss finish, and shall not darken or change colour appreciably during service. For yellow paint the Department requires a colour that matches the CGSB 505-308 colour chip.
9. The degree of settling (ASTM D869) after 6 months storage shall have a minimum rating of 5 out of 10, using 500 ml containers.
10. The paint shall have a no pick-up time (ASTM D711) of less than 20 minutes, for 375 microns wet film thickness at 25°C and 55% RH.
11. The paint shall have a minimum resistance to bleeding (ASTM D969 and D868) rating of 6 out of 10.

12. The viscosity (ASTM D562) of the paint when tested at 25°C shall be between 75 and 85 Kres units inclusive.
13. The particle coarseness of the paint shall not exceed 1.0% by weight (ASTM D185).

F. SAMPLE EVALUATION, TESTING AND SELECTION

1. The identity of any of the samples shall not be known to any person involved in the testing or evaluation, until such testing and evaluation is completed. Samples delivered to the Department will have all identifying labels removed, to be replaced by a code number for identification purposes.
2. All samples will be tested by a qualified testing laboratory, to determine their compliance with the specifications.
3. Samples meeting the specifications shall be road tested (ASTM D713) as follows:
 - a. Two transverse 10 cm wide road stripes are required for each new formulation submitted and are to be applied to a bituminous surface using spray equipment, at controlled rates using the designated amount of beads.

Additional transverse lines are required to be applied during colder temperature applications (0 - 10°C) for low VOC, low temperature traffic paint. Two transverse 10 cm wide road stripes of each formulation submitted are required.

- b. At regular monthly intervals, the stripes shall be evaluated by a panel of four qualified members, to determine the general appearance and luminous directional reflectance of each test stripe. The road stripes must be evaluated until failure (normally 6 months).
- c. The rating obtained shall be averaged and weighted, and a service factor shall be determined. The weighting factors used will depend on the relative importance of the elements being rated, as well as the time since application. These weighting factors will be set at the discretion of the Department.
- d. Suppliers of paints that meet the Department's acceptable service factor will be placed on the department's approved products list.
- e. Retro-reflective readings will be determined during the inspection using an approved Field Retro-reflectometer (currently Mirolux 30) to supplement ASTM D713 bead loss rating. Initial Petro-reflective readings are also required after the application of the new paint formulation.

4. Road stripes are evaluated on the following basis:

ROAD SERVICE TESTS
ASTM D713

FACTOR RATED		DESCRIPTION			
a)	General Appearance - 50% Rated out of 10.	Includes:	<ul style="list-style-type: none"> - Abrasion - Bleeding - Chipping - Colour - Cracking - Dirt Retention - Hiding Power - Pitting - Wrinkling - Other Failure Types <p>As viewed from 2 - 4 m, comparing worn and unworn areas, as well as comparing the stripe to panel at the same time, with the same paint thickness and subsequently stored in a cool, dark, dry location.</p>		
b)	Luminous Directional Reflectance - 50% Rated out of 10.	Includes:	<ul style="list-style-type: none"> - Bead Loss - Paint Reflectance <p>As measured either visually, in sunlight or in an artificial light beam at night, or by a directional reflectance meter.</p>		
<u>TOTAL = 100%</u>					
RATING OF SUBJECTIVE TESTS					
c)	Changes or Undesirable Feat.	*% Lost	Desirable Feat.	*% Retained	Rating
	None	0	Perfect	100	10
	Slight Trace	1	Excellent	99	9
	Trace	2 - 4	Very Good	96 - 98	8
	Slight	5 - 7	Good	93 - 95	7
	Slight to Moderate	8 - 12	Fairly Good	88 - 92	6
	Moderate	13 - 18	Fair	82 - 87	5
	Moderate to Marked	19 - 25	Fairly Poor	75 - 81	4
	Marked	26 - 34	Poor	66 - 74	3
	Very Marked	35 - 47	Bad	53 - 65	2
	Severe	48 - 68	Very Bad	32 - 52	1
	Complete Failure	68 - 100	None	0 - 31	0

*** AS ESTIMATED BY RATING PANEL**

G. PRODUCTION

1. Each container shall be clearly marked as to the contents, batch number, date of production and company formulation number.
2. A complete report of the paint properties and composition as actually determined by the supplier, as well as batch number, date produced, batch size and destination, shall be submitted for each batch. This will be held in confidence and is for Department use only.
3. All paint shall meet the specifications herein contained.

H. TESTING, ACCEPTANCE AND REJECTION

1. Random samples will be taken from each batch. These and the samples submitted by the supplier, will be subjected to testing to ensure good comparison of the batch production to the approved formulation.
2. Paint not meeting the foregoing specifications, or not within the specified range from the approved formulation, may be rejected at no cost to the Department.
3. The paint shall have a rating of not more than 1 unit different from sample when tested for degree of settling (ASTM D869) after 6 months storage and resistance to bleeding (ASTM D969 and D868), provided they are within specifications as shown under E:9 and E:11 respectively.
4. No pick-up time shall be within 20% of approved formulation in side by side testing (ASTM D711). The viscosity (ASTM D562) shall be within ± 5 Kreb Units of the tender sample, provided they are within the specifications as shown under E:10 and E:12 respectively.
5. Tests may include any of the following and any others selected by the Department. The test results on each batch shipment of paint shall match the test results on the tender sample within the following limits:

BATCH/TENDER COMPARISON TESTS

TEST METHOD		BATCH ALLOWANCES	REMARKS
a.	Specific Gravity ASTM D1475	Within ± 0.025 kg/P of approved formulation	
b.	Degree of settling (Accelerated) ASTM D1309	Within ± 1 unit of approved formulation	Out of ten (500 ml Containers)
c.	45° - 0° Directional Reflectance (ASTM E313)	Allowable variation from approved formulation: BRIGHTNESS YELLOWNESS WHITE $\pm 5\%$ $\pm 10\%$ YELLOW $\pm 5\%$ $\pm 10\%$	Using BYK Gardner Color Guide Spectrophotometer.
d.	60° Gloss ASTM D523	Within 3 units of approved formulation	Using Photovolt Gloss Meter, Model 660
e.	Hiding Power CGSB 1-GP-71(14.7)	Within 10% of approved formulation m ² /L	
f.	Set-To-Touch Time ASTM D1640	Within 2 minutes of approved formulation	375 microns thickness 25° C & 55% R.H.
g.	Skinning CGSB 1-GP-71 (10.1)	No skinning allowed.	250 ml containers
h.	Abrasion Resistance ASTM D968	From 90 - 120% of approved formulation (litres/mil)	Sand weighed and volume calculated. Glass panels Wet film thickness = 100 micron, Cured at 25°C and 55% R.H.
i.	Flexibility ASTM D522	Within 20% of the mandrel diameter, at which cracking occurred on approved formulation	Using conical mandrel 375 microns thickness.
j.	Water Resistance ASTM D870	Within 1 unit of approved formulation	Out of 10. Cure 48 hours, 75 microns (dry) thickness.
k.	Particle Coarseness ASTM D185	Within $\pm 0.3\%$ (Absolute) of approved formulation (% retained on 45 μ m sieve) and not to exceed 1%.	Using methyl ethyl ketone on 100 g sample, dried at 105°C.

TEST METHOD		BATCH ALLOWANCES	REMARKS
l.	Fineness of Grind ASTM D1210	Within 1 Hegman unit of approved formulation	
m.	Pigment Content CGSB 1-GP-71(21.1)	Within 2% of approved formulation, (absolute) (wt.)	
n.	Non-volatile vehicle content CGSB 1-GP-71(17.1)	Within 2% of approved formulation, (absolute) (wt.)	
o.	Non-volatile vehicle content CGSB 1-GP-71(19.1)	Within 2% of approved formulation, (absolute) (wt.)	
p.	Water content CGSB 1-GP-71(24.1)	Within 0.2% of approved formulation, (absolute) (%)	
q.	Other tests as deemed suitable such as: <ul style="list-style-type: none"> - Chemical Analysis - Colour Tests - Drying Times - Storage Properties - Handling Properties - Resistance to Handling - Flash Point, etc. 		